

Claims

*(SMP)*

1. A fluid system having a single source of pressurized supply fluid that receives fluid from a reservoir and being operable to control multiple loads, the fluid system comprising:

5 a first fluid circuit connected to the single source of pressurized supply fluid and having a first directional control valve connected to a first fluid cylinder having head end and rod end ports, the first directional control valve having a supply inlet port connected to the single source of pressurized fluid, first and second outlet ports connected to the respective head end and rod end ports of the fluid

10 cylinder, and an exhaust port connected to the reservoir; the first directional control valve being movable between a center position and first and second operable positions; in the center position, the supply port, the first and second outlet ports and the exhaust port are blocked from one another; in the first operable position, the supply port is in communication with the second outlet port and the first outlet port is in communication with the exhaust port; and in the second operable position the supply port is in communication with the first outlet port and the second outlet port is in communication with the supply port; and

15 a second fluid circuit connected to the single source of pressurized supply fluid in parallel with the first fluid circuit and having a second

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directional control valve connected to a second fluid cylinder having head end and rod end ports, the second directional control valve having a supply inlet port connected to the single source of pressurized fluid,

5 first and second outlet ports connected to respective head end and rod end ports of the second fluid cylinder, and an exhaust port connected to the reservoir; the directional control valve being movable between a center position and first and second

10 operable positions; in the center position the supply port is blocked from the first and second outlet ports and the head end and rod end ports are blocked from the exhaust port; in the first operable position the supply port is in communication with the second outlet

15 port and the first outlet port is in communication with the exhaust port; and in the second operable position the supply port is in communication with the first outlet port and the second outlet port is in communication with the exhaust port.

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2. The fluid system of claim 1 including a diverter valve operatively connected between the head end of the first fluid cylinder and the reservoir, the diverter valve being biased to a flow blocking

25 position by a mechanical biasing mechanism and the pressure in the rod end of the first fluid cylinder and movable towards a flow passing position in response to pressurized fluid in the head end of the first fluid cylinder.

*Sub C1* 3. The fluid system of claim 2, including a relief valve disposed between the diverter valve and the reservoir.

*Sub D2* 5 4. The fluid system of claim 1 including a first vented load check valve disposed between the first outlet port of the first directional control valve and the head end of the first fluid cylinder and a second vented load check valve disposed between the 10 second outlet port of the first directional control valve and the rod end of the first fluid cylinder.

*Sub E1* 5. The fluid system of claim 4 including a pilot control system having a source of pressurized 15 pilot fluid and a control input arrangement connected to the source of pressurized pilot fluid, the first and second directional control valves being movable from their respective center positions in response to receipt of pressurized pilot fluid being directed 20 thereto from the control input arrangement through respective first, second, third and fourth pilot conduits.

*Sub D3* 25 6. The fluid system of claim 5 wherein the first and second vented load check valves each have pressure chambers that are in communication with the respective head and rod ends through orificed conduits and the pilot control system includes respective first and second two-position valves spring biased to a 30 closed position and each disposed between the

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respective pressure chambers and the reservoir, the first two-position valve being movable to a flow passing position in response to pressurized pilot fluid being directed to one end of the first 5 directional control valve, and the second two-position valve being movable to its flow passing position in response to pressurized pilot fluid being directed to the other end of the first directional control valve.

10 7. The fluid system of claim 6 including a third vented load check valve disposed between the first outlet port of the second directional control valve and the head end of the second fluid cylinder and a fourth vented load check valve disposed between 15 the second outlet port of the second directional control and the rod end of the second fluid cylinder.

8. The fluid system of claim 7 wherein the third and fourth vented load check valves each have 20 pressure chambers that are in communication with the respective head and rod ends through orificed conduits and the pilot control system includes respective third and fourth two-position valves spring biased to a closed position and each disposed between the 25 respective pressure chambers and the reservoir, the third two-position valve being movable to a flow passing position in response to pressurized pilot fluid being directed to one end of the second directional control valve, and the fourth two-position 30 valve being movable to its flow passing position in

response to pressurized pilot fluid being directed to the other end of the second directional control valve.

5 *Sub E* 9. The fluid system of claim 6 wherein the flow from the pressure chamber of the second vented load check valve through the second two-position valve is directed to the reservoir through a connection between the second vented load check valve and the first directional control valve and the fluid system 10 also includes a one way check valve disposed between the connection and the second two-position valve, the one-way check valve permits flow from the two-position towards the connection and prohibits reverse flow.

15 10. The fluid system of claim 9 including a two position bypass valve disposed in parallel with the one-way check valve between the second two-position valve and the connection between the second vented load check valve and the first directional 20 control valve, the two position bypass valve being biased towards a flow passing position and movable to a flow blocking position in response to a pilot signal being directed to the second directional control valve through the fourth pilot conduit.

25 *Sub A* 11. The fluid system of claim 10 including a diverter valve operatively connected between the head end of the first fluid cylinder and the reservoir and a relief valve disposed between the diverter valve 30 and the reservoir, the diverter valve being biased to

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a flow blocking position by a mechanical biasing mechanism and the pressure in the rod end of the first fluid cylinder and movable towards a flow passing position in response to pressurized fluid in the head 5 end of the fluid cylinder.

12. The fluid system of claim 11 including a second diverter valve operatively connected between the rod end of the first fluid cylinder and the 10 reservoir, the second diverter valve being biased to a flow blocking position by a second mechanical biasing mechanism having a biasing force greater than the mechanism biasing force of the first diverter valve and the pressure in the rod end of the first fluid 15 cylinder and movable towards a flow passing position in response to pressurized fluid in the head end of the first fluid cylinder.

13. The fluid system of claim 10 including a diverter valve operatively connected between the head end and the rod end respectively of the first fluid cylinder and the reservoir through respective diverter valve head end and rod end exhaust ports, the diverter valve is movable between a flow blocking at 20 which the respective head end and rod ends are blocked from the respective head end and rod end exhaust ports and a flow passing position at which the respective rod and head ends are open to the respective head end and rod end exhaust ports, the diverter valve being 25 biased to a flow blocking position in response to a 30

mechanical biasing mechanism and the pressure in the rod end of the first fluid cylinder and movable to a flow passing position in response to pressurized fluid in the head end of the first fluid cylinder.

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*Sub E1* 14. The fluid system of claim 13 including a relief valve disposed between the head end exhaust port of the diverter valve and the reservoir and a two-position blocker valve disposed between the rod end exhaust port and the reservoir, the two-position blocker valve being spring biased to a flow passing position and movable to a flow blocking position in response to pressurized pilot fluid being directed to the second directional control valve through the fourth pilot conduit.

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*Sub AB* 15. The fluid system of claim 9 including a diverter valve operatively disposed between the rod end port of the first fluid cylinder and the second vented load check valve and operatively connected to the head end port of the first fluid cylinder, the diverter valve is biased to a position to permit fluid flow between the rod end of the first fluid cylinder and the second vented load check valve and block fluid flow from the head end port to pass therethrough by a mechanical biasing mechanism and the pressure of the fluid in the rod end of the first fluid cylinder, the diverter valve is movable to a second position at which the flow from the rod end is diverted towards the reservoir and the flow from the head end port is

permitted to pass therethrough towards the reservoir, the diverter valve is movable towards the second position in response to the pressurized fluid in the head end of the first fluid cylinder.

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*sub E17* 16. The fluid system of claim 15 including a relief valve disposed between the head end flow from the diverter valve and the reservoir and a two-position blocker valve disposed between the rod end flow from the diverter valve and the reservoir, the two position blocker valve being biased to a flow passing position by a mechanical biasing mechanism and movable to a flow blocking position in response to pressurized pilot fluid being directed to the second 10 directional control valve through the fourth pilot conduit.

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